

Claims

[c1] I claim:

1. Apparatus for measuring the micro granulometry comprising:
 - 1.1. Micro tube 1 in which the length is many times greater than the width and the cross-section is rectangular or circular (see AA on FIG. 1). Milliliters scale 2 is marked on the face side.
 - 1.2. Rolling holders pivoted 8.1 and held with spring 8.2.
 - 1.3. Sources: Gamma source 10, Sonic source 11.
 - 1.4. Receivers: Gamma receiver 12, Sonic receiver 13.
 - 1.5. Vertical screw 14 and rotating nut 15.

[c2] 2. Micro tube 1 included in apparatus in claim 1 is rectangular in cross section AA on FIG. 1.

[c3] 3. Micro tube 1 in claim 2 is made from glass or other transparent materials allowing further microscopic description and analysis (including visual analysis).

[c4] 4. Micro tube 1 in claim 2 measures 12.5 millimeters by 150 millimeters. The total volume is 18.4 ml. The total sample volume may be as low as 5 milliliters.

- [c5] 5. Rolling holder in claim 1 pivoted 8.1 and held on the axis with spring 8.2 is a device that keeps the tube in strictly vertical position and slides it vertically while maintaining contact with the sources and the sensors.
- [c6] 6. Rolling holders are comprised of a pair of micro wheels made from rubber or plastic and connected with each other by a bar with pivot 8.1.
- [c7] 7. The pivot 8.1 has an arm with a spring pushing the wheels to the tube; this in turn holds the tube in a strictly vertical position.
- [c8] 8. Gamma source 10 in claim 1 is a pulsing source of directional gamma rays focused into a narrow beam. This focusing is accomplished by absorbing all the rays that are not parallel to the open tube.
- [c9] 9. Gamma receiver 12 is a detector, placed at the end of a tubular lead shield. It detects only the gamma rays that are not absorbed by the sample in the test tube.
- [c10] 10. The miniature tube 28, FIG. 4 in claim 9 is made from lead and will absorb most of the naturally occurring background gamma rays.
- [c11] 11. The pulsing source in claim 8 is depicted in Fig. 4. It is comprised of: – Motor 25 and Axis 24 that rotate

sphere 22. – A lead cover 20 and lead wall 21 that shield the gamma ray source.

[c12] 12. The process for measuring the Microgranulometry.

This is comprised of:

12.1. A means of placing the micro sample in the micro tube.

12.2. A means of agitating the mixture of samples with water in micro tube.

12.3. A means of measuring the properties of the sample in the tube.

12.4. A means of recording and interpreting the data.

12.5. A means of microscopic examination of the tube that contains the resulting layered aggregate.

[c13] 13. A means of placing the micro sample in the micro tube in claim 12.1. The means to extract a small amount of sample from the main bulk sample and disperse it in dry condition. The extracted aggregate is discharged in to the micro tube 1.

[c14] 14. A means of agitating the mixture of samples with water in micro tube in claim 12.2 is the process of adding water to the micro tube with sample and closing the top orifice of the micro tube with a cap. The micro tube is shaken until the sample becomes completely mixed in the water.

- [c15] 15. A means of measuring the properties of the sample in the tube in claim 12.3. This includes a means for passing the micro tube in close proximity to the sources 10, 11 and their corresponding sensors 12, 13 so as to obtain a useful signal on an electronic measuring device. This signal is digitized and sent to the CPU.
- [c16] 16. A means of recording and interpreting the data in claim 12.4 using software that is capable of further processing the results for interpretation.
- [c17] 17. A means of microscopic examination of the tube that contains the resulting layered aggregate mentioned in claim 12.5 by viewing the side of the micro tube to describe and measure the layers in the micro tube based on its visual characteristics.